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MONOPODALIC BALANCE AND STRENGHT ASYMMETRY OF THE LOWER LIMBS DURING VERTICAL JUMP IN AMATEUR FOOTBALL PLAYERS

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Introduction

It has been shown as a program of balance training (BT), made with balance boards, could reduce the imbalances between homologous limbs (1), was also highlighted that BT is able to modify the jumping technique of football players (2) . However, there are not studies that compare asymmetry of the lower limbs, measured by a monopodalic balance test on an electronic balance board and by a bipodalic jump test on a double force platform. The purpose of this study is to investigate whether monopodalic balance is correlated with strength asymmetries of the lower limbs, as assessed by a vertical jump (CMJ) on a double force platform in amateur football players.

Methods

Eighteen males amateur football players (age 20.6 ± 2.4, weight 72.9 ± 5.8 kg, height 182 ± 6 cm, body fat 12.2 ± 2.1%, dominant leg: right 15, Left 3) were tested. The dominant limb shall be the one that expresses the best technical skills like shooting and passing. Latero-lateral monopodalic balance ability was evaluated with Libra (Easytech, Prato, Italy). The subjects had to remain in monopodalic stance on a tilting balance board observing a fixed point for a total of 3 tests for limb (average estimated), lasting 30 seconds each, with intervals of 30 seconds between each test. The result is expressed by a value defined Global index, the better the closer it gets to zero. Ground reaction force during jump was evaluated by Twin Plates Test (TPT) on a double force platform (Globus, Treviso, Italy) with a sampling frequency of 1000 Hz. The protocol provides for the execution of a bipodalic jump preceded by a countermovement (CMJ) with hands on hips followed, after the contact to the ground, by an isometric stabilization phase with an angle of 90° at the knee, for a total of 3 tests (average estimated). The signal simultaneously recorded by the dynamometer is then separately analyzed for each limb and divided into seven phases corresponding to as many neuromuscular activation patterns (load static distribution, concentric and eccentric strength peak, flight phase, impact strength, pre-stabilization eccentric strenght and stabilization isometric strength). The correlation between balance and ipsilateral strength was studied using the Pearson correlation index, the difference between means (dominant / nondominant) by t-test for paired data (SAS software version 9.0).

Results and Discussion

The results are summarized in Table 1.

	Global Index Libra (a.u.)	Load distribution (N)	Eccentric peak (N)	Concentric peak (N)	Impact force (N)	Eccentric Pre-stab. (N)	Isometric Stab. (N)
Dom	5.8±3.0	346±56	714±175	912±78	1616±225	681±115	373±33
No.dom	6.4±3.2	389±99	742±94	925±103	1563±342	673±154	391±41
Diff Dom/No.dom	-0.6	-43	28	13	53	8	18
P-value	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Pearson's Index (a.u./N)	Dom	-0.05	0.35	0.29	0.34	-0.40	0.10
	No.dom	-0.17	-0.08	-0.18	-0.06	0.09	0.21

Table 1. Mean ± SD of the results. Dom: dominant limb; No.Dom: non-dominant limb; ns: not significant; au: arbitrary units.

According to the Hopkins scale there were no significant correlations between balance ability and ipsilateral strength such as no significant differences were found between dominant and non-dominant limb.

Conclusions

The monopodalic balance ability does not seem to have significant repercussions on the various strength expressions and load distribution of the various phases of a bipodalic CMJ. These results could be due to the small number of subjects tested, as well as the lack of sensitivity of the libra Global index in this context or to the actual non-influence of balance ability on the strength expression of homologous limb in the various phases of a bipodalic jump. This should be taken into account during rehabilitation and injury prevention programs aimed at players, assisting traditional balance training performed by boards with exercises that require balance maintenance during sport-specific movements. Finally these data are a useful reference for functional recovery of football players after injury.

Picture 1. Picture show Libra and Twin Plates instruments

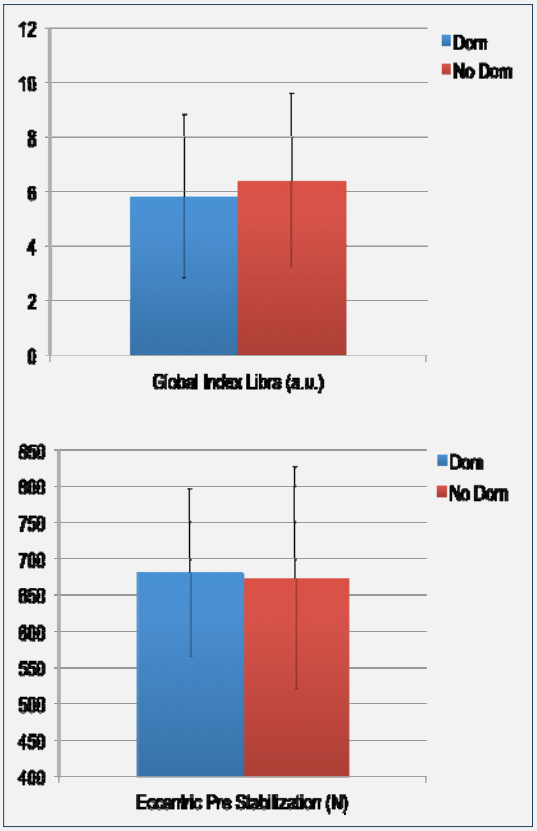

Figure 1. Graphs show the averages of Global Index Libra (a.u.) and and Eccentric Pre Stabilization (N).

Picture 2. Pictures show a heading with contrast with opponent and in a wet field.

References

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